

Remarks/Arguments:

Claims 1, 9 and 14 have been amended. No new matter is introduced herein.
Claims 1-7, 9, 10 and 12-14 are pending.

Claims 1, 9 and 14 have been amended to clarify that the first and second dielectric films are formed to be substantially point symmetric with each other across the first and second faces of the piezoelectric plate. Basis for the amendment can be found, for example, at page 2, lines 23-25 and Fig. 1 of the original specification. In addition, claims 1, 9 and 14 have been amended to clarify the ratio of the thickness of the first and second dielectric films to the thickness of the piezoelectric plate as t_s/t_p . Basis for the amendment can be found, for example, at page 5, lines 13-25, and Fig. 2 of the original specification.

The Amendment filed June 1, 2007, to the Specification has been objected to as introducing new matter. In particular, the sentence "In other words, the dielectric films are symmetric with respect to a diagonal line extending through the center of the piezoelectric plate," has objected to as introducing new matter. This sentence has been removed from the Specification. Accordingly, Applicant respectfully requests that the objection to the specification be withdrawn.

Claims 1-7, 9, 10 and 12-14 have been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. In particular, the Examiner asserts that there is no support in the original specification for the feature of dielectric films disposed substantially symmetric with respect to a diagonal line, recited in claims 1, 9 and 14. As discussed above, claims 1, 9 and 14 have been amended to clarify that the first and second dielectric films are formed to be substantially point symmetric with each other across the first and second faces of

the piezoelectric plate. As shown in Fig. 1, the first and second dielectric films 3 are point symmetric with each other across the faces (covered by electrodes 2) of piezoelectric plate 1 (i.e., symmetric with each other about a point in the piezoelectric plate). Accordingly, Applicant respectfully requests that the rejection of claims 1-7, 9, 10 and 12-14 under 35 U.S.C. § 112, first paragraph, be withdrawn.

Claims 1-7, 9, 10 and 12-14 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Suzuki (JP 62-81807) in view of Shibata et al. (U.S. Patent No. 6,556,103). It is respectfully submitted, however, that these claims are now patentable over the cited art for the reasons set forth below.

Claim 1, as amended, includes features neither disclosed nor suggested by the cited art, namely:

... a ratio of a sum of a thickness (ts) of the first dielectric film and the second dielectric film to the thickness (tp) of the piezoelectric plate is provided in a range such that an electro-mechanical coupling factor is substantially constant ...

... the range of the ratio (ts/tp) is between 0.7 and 2.0, inclusive ...

... the first dielectric film and the second dielectric film are formed to be substantially point symmetric with each other across the first face and the second face of the piezoelectric plate ...
(Emphasis Added)

Claims 9 and 14 includes similar recitations.

Suzuki discloses, in Figs. 1 and 2(e), a piezoelectric thin film resonator having an upper electrode 8 and a lower electrode 6. A dielectric film 5 is formed on lower electrode 6 and a dielectric film 9 is formed on an upper electrode 8 (Abstract). As acknowledged by the Examiner, Suzuki does not disclose or suggest "a ratio of a sum of a thickness (ts) of the first ... and the second dielectric film to the thickness (tp) of

the piezoelectric plate is provided in a range ... the range of the ratio (ts/tp) is between 0.7 and 2.0, inclusive" (emphasis added). In addition, Suzuki does not disclose or suggest Applicant's claimed features of "the first dielectric film and the second dielectric film are formed to be substantially point symmetric with each other across the first face and the second face of the piezoelectric plate" (emphasis added). These features are neither disclosed nor suggested by Suzuki. As shown in Fig. 2(e) of Suzuki, dielectric films 5 and 9 are not formed to be substantially point symmetric with each other across the first face and the second face of resonator 7. Accordingly, Suzuki does not include all of the features of claim 1.

Shibata et al. disclose, in Figs. 3 and 4, a piezoelectric resonator that includes piezoelectric thin film 18, dielectric thin films 14 and electrode thin films 16 (col. 5, lines 48-56). Shibata et al. further disclose that SiO₂ is used to form dielectric thin films 14 and ZnO is used as piezoelectric thin film 18 (col. 5, lines 57-58 and col. 5, lines 61-62). Shibata et al. do not disclose or suggest Applicant's claimed features of "a ratio of a sum of a thickness (ts) of the first dielectric film and the second dielectric film to the thickness (tp) of the piezoelectric plate ... the range of the ratio (ts/tp) is between 0.7 and 2.0, inclusive" (emphasis added). These features are neither disclosed nor suggested by Shibata et al.

The Examiner asserts, on p. 3 of the Office Action, that Shibata et al. disclose a ratio of 1.89 (col. 7, line 54) and 1.83 (col. 12, line 25). Applicant respectfully disagrees. At col. 7, lines 53-54, Shibata et al. disclose a "SiO₂ film thickness/ZnO film thickness is about 0.53." Accordingly, the SiO₂ dielectric film thickness 14 corresponds to Applicant's claimed thickness "ts" and the ZnO piezoelectric film thickness 18 corresponds to Applicant's claimed thickness "tp." Thus, at col. 7, line 54, Shibata et al. recite a ratio of "ts/tp" of 0.53. At col. 12, lines 24-25, Shibata et

al. recites " $\text{SiO}_2/\text{Al}/\text{ZnO}/\text{Al}/\text{SiO}_2 = 0.3/0.1/1.1/0.1/0.3$." Accordingly, the thickness "ts" of dielectric films 14 is equal to $0.3 + 0.3$ or 0.6 and the thickness "tp" of piezoelectric film 18 is 1.1 . Thus, at col. 12, lines 24-25, Shibata et al. recite a ratio "ts/tp" of 0.55 . Accordingly, Shibata et al. do not disclose or suggest a thickness ratio ts/tp between 0.7 and 2.0 , inclusive, as recited in claim 1.

In addition, Shibata et al. do not disclose or suggest Applicant's claimed features of "the first dielectric film and the second dielectric film formed to be substantially point symmetric with each other across the first face and the second face of the piezoelectric plate. These features are neither disclosed nor suggested by Shibata et al. Thus, Shibata et al. do not include all of the features of claim 1 and do not make up the deficiencies of Suzuki. Accordingly, allowance of claim 1 is respectfully requested.

Claims 2-7 include all of the features of claim 1 from which they depend. Accordingly, claims 2-7 are also patentable over the cited art.

Amended claims 9 and 14, although not identical to claim 1, includes features similar to claim 1 that are neither disclosed nor suggested by the cited art. Namely, that 1) a ratio ts/tp of the dielectric film thickness to the piezoelectric film thickness is provided in a range such that an electro-mechanical coupling factor is substantially constant, where the ratio ts/tp is between 0.7 and 2.0 , inclusive and that 2) the first and second dielectric films are formed to be substantially point symmetric with each other across the first and second faces of the piezoelectric plate. Accordingly, allowance of claims 9 and 14 is respectfully requested for at least the same reasons as for claim 1.

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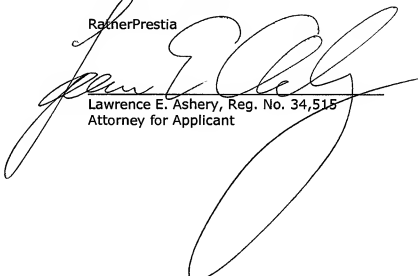
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Claims 10, 12 and 13 include all of the features of claim 9 from which they depend. Accordingly, claims 10, 12 and 13 are also patentable over the cited art.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance, which action is respectfully requested.

Respectfully submitted,

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